

1. That the sand-canal is intended from time to time to *discharge* externally the fluid contents of the ambulacral system of tubes.

2. That the ambulacral or water-vascular system of those Echinoderms in which it exists, is a modification of a *part* or the whole of the so-called blood-vascular system of the Annulose families in general.

3. That in both the former and in the latter instances the fluid contained in the vascular system is *derived by absorption* from the cavitory fluid.

In a paper lately laid before the Royal Society I have described an organ in the Annulose and Radiated classes, which I have ventured for the present to call the "Segmental organ," and which is to the "*cavitory fluid*" what the madreporiform tubercle in *Asterias*, and the cervical fissures in the Nemertidæ, are to the contents of the vascular system. *Both* are provisions for the *immediate and direct excretion* of the *entire body of the nutritive fluids*. These facts prove that as we descend the scale of animal life, the mechanism of the physiological act of "*secretion*" is simplified in the ratio in which the fluids and solids of the living body themselves are simplified!

I remain, Gentlemen, your obedient servant,

THOMAS WILLIAMS, M.D., F.L.S.

VII.—*Remarks on the Inferior Oolite and Lias in parts of Northamptonshire, compared with the same Formations in Gloucestershire.* By the Rev. P. B. BRODIE, M.A., F.G.S.

HAVING, at a late meeting* of the Cotteswold Naturalists' Club, given a *vivâ voce* account of the Inferior Oolite and Lias in a part of Northamptonshire; at the request of the Secretary, I have prepared a more detailed description for our 'Proceedings.' It is well known that certain beds in the Inferior Oolite in the neighbourhood of Northampton have been extensively worked for the ironstone which largely prevails in it thereabouts, though I believe it is not now so generally used for œconomical purposes as it was formerly. This was certainly the case with those quarries which I examined near Blisworth. They are not worked to any great depth, and occupy the higher ground in the district; the strata consist of sandy ferruginous oolitic stone containing a few imperfect casts of shells, though the greater part of the mass is unfossiliferous: the top beds are coarse, and contain impressions of shells; the lower ones are more compact, and are composed chiefly of ironstone. The Inferior Oolite

* Held at Cheltenham in August 1856.

here appears to be of no great thickness, and differs materially from that of the Cotteswolds. The hills which are occupied by it near Blisworth are comparatively low, and form a striking contrast to those in Gloucestershire partly composed of the same formation. The fossils I obtained were a large *Cardium*, a *Trigonia*, a *Pecten*, *Terebratulæ*, and a few Univalves. Fossils are much more abundant at Northampton, though only occurring there in the form of casts.

Upper Lias.—From the position of the Inferior Oolite, the Upper Lias was to be looked for at a low level at the base of these hills, and I accordingly found it in a brick-pit in the valley at Bugbrook between Weedon and Blisworth, below the level of the Railway at no great distance from the Kilsby tunnel. Beds of Lias clay and shale are used for brick-making with the usual Upper Lias fossils, among which *Ammonites serpentinus* and *Belemnites* were very prevalent. The clay is traversed by a thin, continuous layer of limestone, which, as I anticipated, turned out to be the ‘fish bed,’ identical lithologically with the same band in Gloucestershire, and full of innumerable fragments of fish (though I could discover none entire) and coprolites, with some specimens, of *Inoceramus dubius* and traces of *Sepia*.

This ‘fish bed’ has been noticed by Mr. Morris in parts of Lincolnshire and Northamptonshire on the Great Northern Railway, and it is very probable that it will be detected in other places where the Upper Lias occurs *in situ*, since it is rarely wanting, in its course through Somersetshire and Gloucestershire, at the lower part of this deposit. In fact, this ‘fish and insect bed’ seems as persistent in the Upper Lias as the ‘Insect limestone’ is in the lower.

The section at Bugbrook is as follows in descending order:—

- | | ft. | in. |
|---|-----|-----|
| 1. Rubbly white limestone in detached bits, in dark blue shale, with numerous fragments of <i>Ammonites</i> | 4 | 0 |
| 2. Thin-bedded limestone (‘fish bed’); white externally, inside has a green tinge with white specks; it has a laminated fracture, and splits readily when weathered; it does not occur in nodules, but in a regular thin band in the clay | 0 | 3 |
| 3. Thin, coarse, dark-coloured slaty stone, very rough, covered with spines, teeth and plates of Echinoderms, resting on the marlstone. | | |

The thickness of the Upper Lias visible at this spot did not exceed a few feet; it is succeeded by the Marlstone with the usual fossils. I could not determine the total thickness of the Upper Lias, as there was no section exposed, but there must be a considerable mass of clay between the Inferior Oolite and the small section at Bugbrook, though probably not half so thick as

the Upper Lias in Gloucestershire, which, according to Mr. Hull of the Geological Survey, amounts at least to 200 feet in many parts of the Cotswolds.

These strata, as well as those of the Inferior Oolite, are perfectly horizontal. When the Railway was in progress, the top beds of the Lower Lias just below the Marlstone were exposed at Kilsby, and were as usual very rich in fossils, similar for the most part to those found in the equivalent strata at Campden, and Hewlett's Hill near Cheltenham.

The summit of Edge Hill in Warwickshire is capped by the Marlstone, the Upper Lias having been denuded; but small boulders of the 'fish bed,' containing scales of fish and '*Inoceramus dubius*,' are of frequent occurrence in the vale below, showing that it formerly occupied its normal position above the Marlstone in that district.

At Alderton, in Gloucestershire, the following strata were exposed below the 'fish bed' in April 1856, which seemed to be richer in fossils than usual, and therefore I have noted them here, which will enable the reader to compare them with those at Bugbrook above mentioned.

Brown and dark shales with many *Ammonites*, *Inoceramus dubius*, *Rostellaria* (abundant), *Cidaris**, *Nucula*, *Avicula*, and *Aptychus*. These are succeeded by two or three blue marly bands divided by shale, which contain a univalve like a *Cerithium*, *Avicula*, *Nucula*, *Pholadomya*, *Pecten*, *Astarte*, and *Ammonites*. A light blue, slightly indurated marl reposes immediately upon the Marlstone. The total thickness of these clays and marls forming the base of the Upper Lias is about 30 feet.

VIII.—*Contributions to the knowledge of the Anatomy of Nautilus Pompilius, L., especially with reference to the male animal.*

By J. VAN DER HOEVEN, M.D., &c. &c., Professor of Zoology in the University of Leyden †.

[With two Plates.]

THE Cephalopod Mollusks belong to those animals in which the sexes are distinct. Long ago the anatomical investigations of Swammerdam, Monro, Cuvier and others made us acquainted

* A similar small species of *Cidaris* (*C. minuta*) occurs abundantly with spines attached in the Upper Lias shale at Gretton near Winchcomb, where a fine specimen of a *Lepidotus* was lately discovered in the 'fish bed,' and is now in the collection of my friend Dr. Wright.

† From the Transactions of the Dutch Royal Academy of Sciences, 1856. Translated by Wm. Clark, M.D., F.R.S., Professor of Anatomy in the University of Cambridge.